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The Impact of Eysenck's Extraversion-Introversion Personality Dimension on Prospective Memory

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Abstract

Prospective memory (PM) is memory for future events. PM is a developing area of research (e.g. Brandimonte, Einstein, & McDaniel, 1996) with recent work linking personality types and their utilisation of PM (Goschke & Kuhl, 1996; Searleman, 1996). The present study compared 28 extraverts and 28 introverts on their short- and long-term prospective memory using the Prospective Memory Scale developed by Hannon, Adams, Harrington, Fries-Dias, & Gibson (1995). The main finding was that extraverts reported significantly fewer errors on short- and long-term PM than introverts, and this difference could not be explained in terms of the number of strategies used to support prospective remembering. These findings are discussed in relation to differences between the personality types.

The Impact of Eysenck's Extraversion-Introversion Personality Dimension on Prospective Memory

This study focuses on potential links between Eysenck's extraversion-introversion personality dimension and long-term and short-term prospective memory.

Memory is generally seen as comprising two types of recall: retrospective and prospective. Retrospective memory is remembering past events or information learned previously. Thus, remembering what you did, or who you saw, yesterday, recalling a list of items when out shopping, or recalling the events of a good movie, are all examples of retrospective memory. Prospective memory is remembering to do things at some future point in time. Thus, remembering that you have to attend a particular function or carry out some personal task at some future point, are both examples of prospective memory. Much research has focused on retrospective memory (see e.g. Baddeley, 1997; Baddeley & Wilkins, 1984; Gruneberg, Morris & Sykes, 1988; Harris & Morris, 1984), with prospective memory research expanding over the past 15 years or so (Andrezejewski, Moore, Corvette & Herrmann, 1991; Ellis, 1988; Hitch & Ferguson, 1991; Kvavilashvili, 1987, 1992; Meacham & Kushner, 1980; Meacham & Singer, 1977; Wilkins & Baddeley, 1978).

Empirical work into prospective memory is increasing. For example, some researchers have focused on "diary studies", in which participants keep diaries of their ability to remember to carry out future tasks (Meacham & Kushner; 1980), or have drawn comparisons between prospective memory and retrospective memory (Andrezejewski, *et al.*, 1991; Hitch & Ferguson, 1991; Kvavilashvili, 1987, 1992; Meacham & Singer, 1977; Wilkins & Baddeley, 1978). Others have focused on the specific characteristics of prospective memory, such as strategy use (Harris, 1980), the role of event-cues in prospective remembering (Ellis, Kvavilashvili, & Milne, 1999),

developmental aspects of prospective memory (Beal, 1988), as a framework for everyday forgetting (Cavanaugh, Grady, & Perlmutter, 1983; Lovelace & Twohig, 1990; Marsh, Hicks, & Landau, 1998), and age-related changes in prospective remembering (Einstein, McDaniel, Richardson, Guynn & Cunfer, 1995; Mantyla, 1994; Maylor, 1990; 1996). For example, there is good evidence of age-related prospective memory decline when laboratory or computer generated tasks are used (Cockburn and Smith, 1991; Craik, 1992; Uttl and Graf, 2000), with older adults showing more prospective memory errors than younger adults. However, a different pattern emerges when questionnaires or everyday measures are used to assess prospective memory, with older adults performing as well as younger adults, but this may be due to the fact that the older adults use more strategies to aid remembering in a real-world context (see Baddeley, 1997).

Prospective memory is an important part of memory and continues to develop as a research area, with authors stressing the need to draw links between prospective memory and other areas of psychology (cf. Brandimonte, Einstein, & McDaniel, 1996). Recent work has attempted to achieve this by studying potential links between prospective memory and personality. In particular, researchers have focused on differences between state and action oriented personality types and their uses of prospective memory (Goschke & Kuhl, 1996), and on differences between type A and type B personality patterns (Searleman, 1996). For example, Searleman (1996) found that people with type A personality patterns are more likely to remember to carry out prospective memory tasks (such as remembering to phone the experimenter and post a card to the experimenter) than were people with type B personality patterns.

Some recent work by Heffernan (unpublished manuscript) looked at potential links between prospective memory for everyday events and Eysenck's extraversion-

introversion dimension of personality. Extraverts and introverts were compared on their prospective memory for social events (e.g. remembering to attend a party, meeting friends for a drink, etc.) and personal events (e.g. remembering to carry out a particular chore, remembering to pay a bill). One salient finding was the fact that extraverts remembered to carry out more prospective memory events than did introverts. Heffernan suggested that extraverts, in addition to using their prospective memory for remembering personal events, developed their prospective memory for personal events more so than introverts, because of the social nature of extraverted people. However, the study did not use a valid and reliable measure of prospective memory. A questionnaire-based measure, the Prospective Memory Scale or PMQ, was developed by Hannon, Adams, Harrington, Fries-Dias, and Gibson (1995). The PMQ is a self-rating scale that requires participants to rate the number of times their prospective memory has failed them within a period of time. The sub-scales measure short-term and long-term prospective memory, as well as gauging the number of strategies used to aid remembering via the Techniques to Remember Scale. The scale shows high internal validity (r= .76) and high test-retest reliability (r=.88). To date the PMQ represents the first full questionnaire focusing upon prospective memory. The PMQ has proved to be a useful tool in measuring the effectiveness of prospective memory in a number of settings, including assessing age-related differences (Elmirghani and Heffernan, In press), as a neuropsychological instrument in the study of brain damaged patients (Hannon *et al,* 1995), and to investigate prospective memory deficits in regular ecstasy users (Heffernan, Ling and Scholey, In press).

The aim of the present study is to examine the links between prospective remembering and personality. More specifically, the study focuses on potential links between Eysenck's extraversion-introversion personality dimension (Eysenck &

Eysenck, 1991), and short-term and long-term prospective memory. An extravert is characterised as someone who has the following characteristics: impulsivity, lack of inhibitions, numerous social contacts and friends, frequently takes part in group activities and dislikes being alone. Conversely, an introvert is characterised as someone who is quiet, reserved and distant (except to intimate friends), is introspective, enjoys his/her own company, and who does not enjoy participating in group activities (see e.g. Eysenck & Eysenck, 1969; 1991). This study looks at the extraversion-introversion personality dimension of the Eysenck Personality Questionnaire Revised (EPQR) (Eysenck & Eysenck, 1991), and assesses prospective memory using the Prospective Memory Scale (PMQ) developed by Hannon *et al.*, (1995). If extraverts do in fact have a better prospective memory, then they should score lower on the prospective memory scale than introverts.

Method

Participants

126 people were assessed using the Eysenck Personality Questionnaire Revised (EPQR)-short questionnaire. From this wider sample, a group of 28 extraverts (age range 17 - 35 years; mean age = 20 years) and 28 introverts (age range 17 - 35 years; mean age = 21 years). See below for the scoring criteria for extraversion and introversion. There were 9 males and 19 females in the extravert group, and 11 males and 17 females in the introvert group. These participants were all unpaid undergraduate students who were recruited using the criteria laid down by the university's ethical guidelines. This meant that each participant was recruited on a voluntary basis, remained anonymous, was instructed of their right to withdraw from the study at any point, and was fully debriefed as to the true nature of the study.

Apparatus and Stimuli

The Eysenck Personality Questionnaire Revised (EPQR)- short questionnaire was used to assess the introversion-extraversion dimension of personality. This 48 item self-report personality scale has been developed from over forty years of research, and is a valid and reliable psychometric measure of personality dimensions (Eysenck & Eysenck, 1991). The instructions for this questionnaire were provided on the scale itself. A person was categorised as extravert if they scored a maximum of 12 on the extravert-introvert personality dimension of the EPQR, or was categorised as introvert if they scored 1 or below on this dimension. Thus the extraverts included in this study scored the maximum of 12 on the scale, whereas the introverts scored 1 or zero on the scale. Extraverts and introverts represent extreme ends of the scale.

Prospective memory was measured using the Prospective Memory Scale (PMQ) developed by Hannon *et al.* (1995). The PMQ is a valid and reliable measure of prospective memory and correlates well with other measures of prospective remembering (see Hannon *et al.*). The sub-scales and sample items used are shown in Table 1. The scores on the Long-Term Episodic Scale and the Short-Term Habitual Scale represent forgetting scores, the greater the score, the more faulty one's prospective memory. The scale ranges from 1 (where least forgetting is evident) to 9 (where there is a great deal of forgetting). The third scale was the Techniques to Remember Scale, which ranges from 1 (few techniques used) to 9 (a great deal of techniques used), which measures the amount of strategies used to aid prospective remembering. On this latter scale, the greater the scores the more techniques one uses to aid remembering.

Design and Procedure

A non-experimental design was used. The extraversion-introversion personality dimension was the independent factor. Scores on the PMQ sub-scales were the dependent measures. The EPQR-short questionnaire was used to assess the introversion-extraversion dimension of personality, in order to classify each participant as either introvert or extravert. Each participant was recruited on a voluntary basis and was told that they would be asked to complete two questionnaires; one relating to how they might behave in different situations, and a second questionnaire assessing everyday memory function. None of the participants approached refused. Each participant was tested separately. After completion of the EPQR-short the participant was asked to complete the PMQ. Each participant was thanked for their co-operation and fully debriefed.

Results

A summary of the results appears in both Table 2 and Figure 1. Short-Term Habitual Prospective Memory (STHPM) and Long-Term Episodic Prospective Memory (LTEPM) appear as mean error scores in prospective memory, reflecting the amount of forgetting in prospective memory. The Techniques for Remembering Scale (TRS) appear as the mean number of techniques used to aid remembering. These data are presented for extraverts and introverts.

Overall, extraverts had a lower error score on the Prospective Memory Questionnaire than did introverts. In other words, extraverts remembered a greater proportion of prospective memory items. This was the case for both Short-Term Habitual Prospective Memory (STHPM) and Long-Term Episodic Prospective Memory (LTEPM). Error scores were higher for the LTEPM than they were for the STHPM scale for both personality types. In addition, extraverts scored higher on the

Techniques for Remembering Scale (TRS). An independent t-test revealed no significant difference between extraverts and introverts on the TRS, t (54) = .616, p = .540. Thus, extraverts and introverts did not differ in terms of the amount of strategies used to aid remembering.

A 2 x 2 mixed analysis of co-variance (ANCOVA) was carried out on the data with personality type (extraverts and introverts) as the between-subjects factor, and type of prospective memory items (STHPM and LTEPM) as the within-subjects factor. Since there is evidence that age affects prospective memory, and since it is possible that males and females may remember different things, age and gender were incorporated as covariates into the analysis. The results of the ANCOVA revealed a significant main effect of personality type, F (1, 52) = 7.12, $p < 0.01$, reflecting a greater proportion of errors in prospective memory in the introverts. There was also a main effect of type of prospective memory scale, F (1, 52) = 4.87, $p < 0.05$, with participants making more errors on the LTEPM scale than on the STHPM scale. There was no interaction between personality type and type of prospective memory scale, F (1, 52) = 1.35, p = .250. In addition, the ANCOVA revealed no significant impact of age F (1, 52) = .142, p = .707, or sex F (1, 52) = .295, p = .589, on prospective memory.

Discussion

A number of conclusions are drawn from this study. First, introverts reported more errors in prospective memory than extraverts, and this was the case for both short-term habitual and long-term episodic prospective memory. This is generally consistent with previous findings from Heffernan (unpublished manuscript) and is explicable in terms of extraverts making greater use of a prospective memory system whereby they can remember future plans more effectively than introverts. This may be

due to the fact that extraverts engage in more behaviour that is likely to require a greater amount of planning for future events/occasions than introverts. Since extraverts are more likely to be engaged in future activities (Eysenck & Eysenck, 1969; 1991) the motivation for them to utilise and develop their prospective memory capabilities would be advantageous. This may be particularly relevant to the fact that extraverts utilise their prospective memory system for personal tasks, such as remembering to pay a bill at some point in the future, as well as for future social events, to a greater extent than introverts.

The fact that both extraverts and introverts produced less errors in short-term, than in long-term, prospective memory may reflect a general decay rate in prospective memory traces across time. Such decay or forgetting is evident in a range of retrospective memory paradigms (see e.g. Baddeley, 1997). These differences between extraverts and introverts cannot be explained in terms of differences between the groups in terms of the amount of strategies used to support prospective remembering. It should be noted that the present study focused on people who fall at two extreme ends of a personality dimension, and that these results should be interpreted in this specific context.

These findings are novel and represent a first step in this area, an expansion that is welcomed by other researchers in the field (e.g. Brandimonte *et al.*, 1996). Research into individual differences in prospective memory is a developing area of research (Goschke & Kuhl, 1996; Searleman, 1996), and could be extended to look at other personality dimensions, such as the 'The Big Five' of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness (Deary & Matthews, 1993). Other tests of prospective memory could be employed in a similar paradigm to the one studied here, such as laboratory-based studies, or diary-based studies,

(Brandimonte *et al.,* 1996; Ellis *et al.,* 1999), in order to confirm the differences between extraverts and introverts found here

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Table 1

Prospective Memory Questionnaire Subscales and Sample Items

Short-Term Habitual Scale - task to be completed within a few minutes after a cue to perform it and occurs on a routine basis. For example: I forgot to turn my alarm clock off when I got up in the morning. I forgot to button or zip some part of my clothing as I was dressing.
Long-Term Episodic Scale - task to be completed hours or days after a cue to perform it and occurs on an irregular basis. For example: I forgot to pass on a message to someone. I forgot to make an appointment I needed to make (e.g., doctor or dentist).
Techniques to Remember Scale - techniques used to help one remember to carry out a prospective memory task. For example: I make a list of things I need to do. I create mental pictures to help me to remember to do something.

Table 2

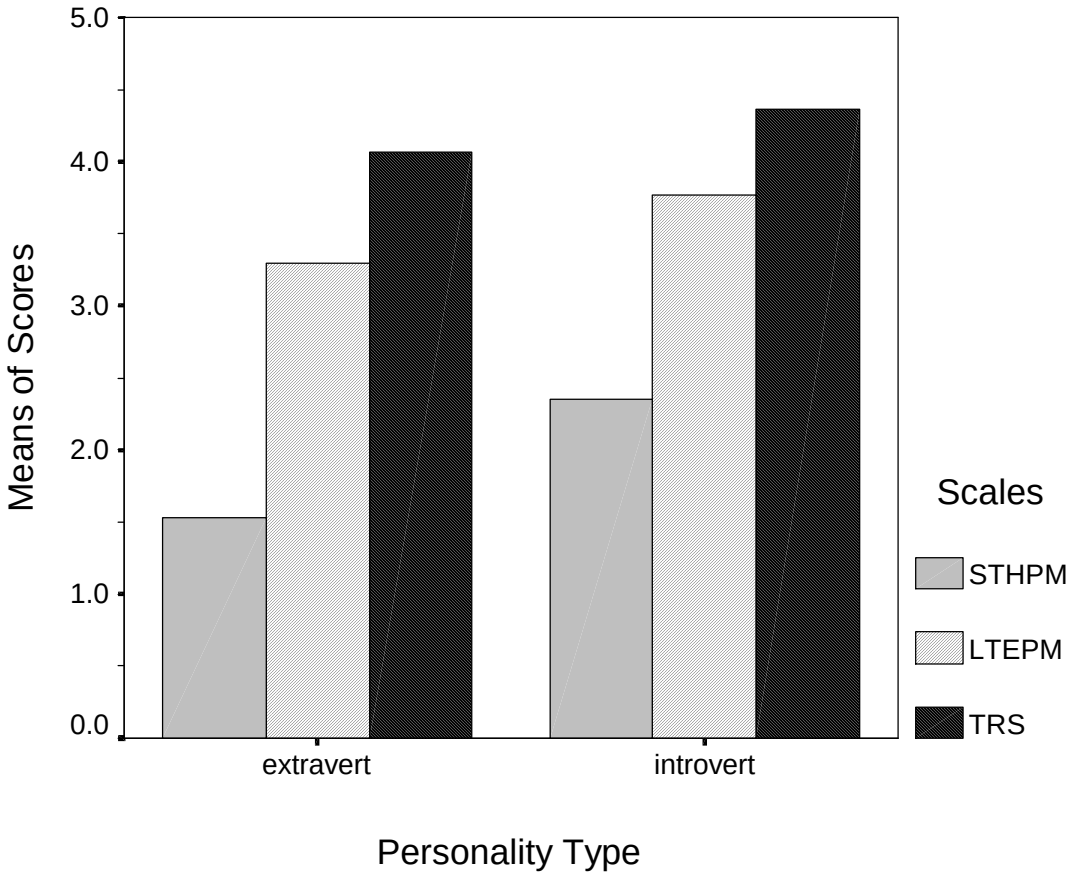
Mean number of short-term and long-term prospective memory errors made, and techniques to aid remembering used, by extraverts and introverts

	Extraverts		Introverts	
Measure	Mean	S.D.	Mean	S.D.
PMQ Sub-Scales				
Short-Term Habitual PM	1.53	.54	2.35	1.00
Long-Term Episodic PM	3.30	1.17	3.77	1.25
TRS	4.07	1.69	4.36	1.83

Note. PM = prospective memory; SD = standard deviation; TRS = Techniques to Remember Scale.

Figure Caption

Figure 1. Mean scores on the Short-Term Habitual Prospective Memory (STHPM) and Long-Term Episodic Prospective Memory (LTEPM), and Techniques to Remember (TRS) scales as a function of personality type (extraverts Vs introverts).


5.0
4.0
3.0
2.0
1.0
0.0
Means of Scores
extravert
introvert
Personality Type
Scales
STHPM
LTEPM
TRS